

FLUORESCENT LIGHTING FIXTURES WITH
CONTROLLED UPLIGHT CAPABILITY

FIELD OF THE INVENTION

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The present invention relates indoor lighting with controlled uplight capability.

BACKGROUND OF THE INVENTION

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In order to make a large area visually comfortable, downlight fixtures often include some uplight capabilities, to reduce the "cave" effect caused by ceiling fixtures being too intense for the viewer to see the ceiling beyond the fixtures.

15 The cave effect causes a glare-filled, enclosed effect, which increases eyestrain.

However, too much uplighting is inefficient and wasteful, not reflecting a large portion of emitted light back to the space below the fixture.

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To provide uplight, it is known to have an open top, which wastes light usage, as much of the light is not reflected back to the space below the fixture. In addition, in general, however, lamp fixtures with open tops have a susceptibility to dirt accumulation.

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Among related patents include US Patent No. 2,281,377 of Ohm, which has a slanted transparent/translucent wall but no

reflector, which does not control uplight to a preferable maximum of 5-19% (by bent and concave angles of the reflector). Ohm's wall 13 is convex, so most light is not controlled. If a fixture were made similar to that of Ohm '377, wherein it would be
5 fabricated without the lens, the fluorescent lamps would extend beyond the plane of the side of the fixture, allowing for excessive dirt accumulation thereon. Furthermore, if one would make a fixture similar to that of Ohm '377 with a non-translucent wall, the fixture efficiency would be greatly diminished. In
10 addition, the lack of a photometrically designed reflector would diminish the obtainable efficiency of the fixture.

US Patent No. 2,534,182 of Schwartz has different angles for reflectors 31, 32, 33 that don't control uplighting. Their rounded lenses are not as efficient as using a flat lens.

15 In US Patent No. 2,548,500 of Sachs, the position of the reflector 15 beneath the fluorescent lamp tubes causes 50% of light up and 50% down, not a preferable controlled 5-19% as uplight. Also, if one removes the item 15 of Sachs, one accumulates dirt within the fixture.

20 US Patent No. 6,428,183B1 of McAlpin gets 100 percent of light up with visual waste and needs extra upper lamps 32,33 with separate mounts. These upper lamps are exposed and subject to dirt accumulation.

US Patent No. 5,806,967 of Soorus is mainly a V-shaped
25 uplight fixture open at top, so dirt will invariably accumulate therein.

US Patent No. 2,545,058 of Walsh has an open top with susceptibility to dirt accumulation. Walsh is mainly upright only as in Figure 10 therein.

US Patent No. 2,474,341 of Wince doesn't have a reflector.

5 US Patent No. 2,348,930 of Shepnoes has a V-shape end view configuration of lamp fixtures. Downward light is less than 70%.

US Patent No. 2,327,230 of Weber is only concerned with access removal of the lens portion 27. Lighting inefficiency is similar to Shepnoes.

10 US Patent No. 2,320,829 of Naysmith and US Patent No. 2,323,002 of Baker both describe V-shaped arrangement of lamps, which does not control upright.

Therefore, there is a need to provide a fluorescent lamp fixture which controls upright to a desirable level, without
15 wasting excess light, while significantly reducing an undesirable cave effect and without the tendency to accumulate dirt within the fixture.

OBJECTS OF THE INVENTION

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It is therefore an object of the present invention to provide a fluorescent lamp fixture which controls upright to a desirable level, without wasting excess light, while significantly reduces an undesirable cave effect and without the
25 tendency to accumulate dirt within the fixture.

SUMMARY OF THE INVENTION

In keeping with these objects and others, which may become apparent, the fixtures of this invention accommodate straight
5 fluorescent tube lamps of a variety of lengths and electrical design, for example popular four foot sizes. These fixtures have a full upper housing protecting all lamps from the accumulation of dust and debris while providing a controlled amount (5 to 19%) of total light output to uplighting, thereby lighting ceiling and
10 wall areas above the fixture, to negate the so-called "cave effect". The percentage range of 5 to 19 percent of total uplighting is controlled relative to the quantity of lamps utilized, the angle of the reflector and the height of the outside section of the fixture, which also impacts the angle of
15 the outboard reflector.

The fixtures of this invention have a central section (from an end view) aimed directly below the fixture with lamp or lamps within a concave reflector or reflectors. Wing sections at an oblique angle extend sideways from the central section, carrying
20 their own lamps and reflectors with totally or largely open distal ends, thereby accommodating uplighting in a controlled fashion. The uplighting provided is at an oblique angle from the fixture, as contrasted from prior-art fixtures with dedicated uplight lamps, or direct vertical upward lenses or windows, which
25 would reflect uplight directly down from the ceiling surface.

These lighting fixtures preferably incorporate a trapezoidal

pendant bracket, which accurately positions the fixture with respect to the pendant pipe and prevents any tendency of the fixture from deviating from orthogonal orientation. However, the pendant bracket of the present invention is usable on any type of suspended light fixture, to stabilize the fixture in place.

In one embodiment the fixture has no lens and the oblique housing sides are shortened to accommodate uplighting. In a second embodiment, a high efficiency lens is used for downlighting. Then the oblique housing sides are fitted with windows also, which are glazed with flat high efficiency lens panels to accommodate uplighting. Each of these embodiments can accommodate a variety of lamp configurations ranging from three to eight fluorescent lamps per fixture.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention can best be understood in connection with the accompanying drawings. It is noted that the invention is not limited to the precise embodiments shown in drawings, in which:

Fig. 1 is a Perspective view of a fluorescent lamp fixture of this invention with no lens;

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Fig. 2 is a Perspective view of a fluorescent lamp fixture of a second embodiment of this invention incorporating lenses;

Fig. 3 is a Top plan view of a fluorescent lamp fixture of this invention (shown with lenses);

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Fig. 4 is a Side elevational view of the fluorescent lamp fixture of Figure 3;

Fig. 5 is an End view of the fluorescent lamp fixture of Figure 3;

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Fig. 5A is a close-up detail side view showing the reflectance of the light rays of fluorescent lamps of the fluorescent lamp fixture of this invention, due to the angle and arc of the reflector having an oblique portion and an arcuate

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portion;

Fig. 5B is a close-up detail side view showing the reflectance of the light rays of fluorescent lamps due to the angle and arc of another embodiment for the reflector having small arcuate concave portion, an oblique portion and an inner arcuate concave portion;

Fig. 6 is an End view of a 3-lamp configuration of a fluorescent lamp fixture of this invention;

Fig. 7 is an End view of a 4-lamp configuration of a fluorescent lamp fixture of this invention;

Fig. 8 is an End view of a 5-lamp configuration of a fluorescent lamp fixture of this invention, also indicating geometric features permitting a controlled amount of uplighting;

Fig. 9 is an End view of a 6-lamp configuration of a fluorescent lamp fixture of this invention; and,

Fig. 10 is an End view of an 8-lamp configuration of a fluorescent lamp fixture of this invention.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows the first embodiment of this invention,
5 wherein fixture 1 uses no lenses. Fixture 1 has six straight
fluorescent tubes 4 within housing 2 with shortened oblique walls
3. Central concave reflector 6 is aimed straight down while side
reflectors 5 are angled obliquely and have no curved section (or
a very truncated one) at their distal ends. Reflector surface
10 finish can vary, however a white finish, a specular reflector, or
an enhanced specular reflector surface with 95% reflectivity are
currently offered.

Pendant pipe 11 is used to attach fixture 1 to a ceiling
structure; it also carries wiring within. It is mounted in hub 8
15 and is located accurately by trapezoidal pendant bracket 10 and
secured by pendant screw 12. However, pendant bracket 10 is
usable on any type of suspended light fixture, to stabilize the
fixture in place.

In a second embodiment, fixture 20 of Figure 2 has housing
20 21 with full oblique walls 22. Walls 22 have three rectangular
windows 24 with flat high efficiency lenses to permit a
controlled amount of uplighting.

Figures 3, 4, and 5 present top, side and end views of
fixture 20 respectively. Vent louvers 28 are used to permit air
25 circulation for cooling of ballasts and lamps while excluding
dust contamination. High efficiency downlight lens 30 covers the

fluorescent tubes.

A variety of lamp configurations for the fixtures of this invention are shown in the end views of Figures 6-10.

For example, Figure 6 shows a 3-lamp fixture 40 with a
 5 single lamp 4 in central reflector 41 and a single lamp in each side reflector 42.

Figure 7 shows a 4-lamp fixture 50 with two lamps within central reflector 51 and single lamps within side reflectors 52.

Figure 8 shows a 5-lamp configuration 60 with a single lamp
 10 in central reflector 61 and two lamps in each side reflector 62. Uplighting rays 64 are shown emanating from right side to illustrate the geometric relationships between the lamp 4 location with respect to reflector 62, truncated end curve 63 and tube 4 surface. Reflector end 63 provides the uplight cut-off
 15 and the structural configuration of the reflectors, lamp location, oblique angle, and lamp fixture population permits design of fixtures with uplight percentage fixed as desired, preferably between 5-19% of total.

For example, Fig. 5A shows the reflectance of the light rays
 20 64, 65 and 66 of fluorescent lamps 4 due to the angle X and arc A of the reflector 42. Reflector 42 has a straight oblique portion 42a and an arcuate portion 42b. A certain portion of rays, emitted from lamp 4 designated as rays 64, are either emitted upward or are reflected off of portions of reflector 42 in an
 25 upward direction. Another portion of rays designated as rays 65 are emitted and directed up, but reflected down by either the

straight oblique portion 42a or the arcuate portion 42b of reflector 42. A third portion of rays designated as rays 66 are emitted and directed down. Therefore rays 64 are the only light rays which constitute any uplighting of light from fixture 42.

5 The amount of uplighting is controlled by controlling the angle α of straight oblique portion 42a off of imaginary horizontal line H1 and the arc A off arcuate portion 42b, off of imaginary horizontal line H1. As a result, a certain percentage of light, such as, for example, 5 to 19 percent, constitutes uplight
10 directed above imaginary horizontal line H2 through the middle of lamp 4, either directly upward from lamp 4 or indirectly upward from lamp 4 via reflector portions 42a or 42b. The remaining portion of emitted rays are either emitted indirectly downward from lamp 4 below imaginary horizontal line H2 off of the center
15 of lamp 4, via reflector portions 42a and/or 42b, or directly downward in the form of rays 66 from lamp 4.

Fig. 5B shows another embodiment of the reflectance of the light rays 64, 65 and 66 of fluorescent lamps 4 due to the angle and arc of the reflector having a first arcuate concave outer
20 portion 42c, a second straight oblique portion 42a and a third inner arcuate concave portion 42b. While the preferable percentage of uplighting is 5 to 19 percent of emitted light reflected above imaginary line H2, that percentage of uplighting can be varied by adjusting the angle of oblique reflector portion
25 42a, inner arcuate concave portion 42b and/or outer arcuate concave portion 42c of reflector 42.

Besides the differences in the configuration of reflector 42 and in the variations in angle X shown in Figures 5A and 5B, the actual size of reflector 42 and its location (i.e. distance from) relative to lamp 4 also have a bearing on the percentage of
5 uplighting.

Figure 9 shows a 6-lamp design 70 with two lamps in central reflector 71 as well as in each of two side reflectors 72. Figure 10 shows an 8-lamp fixture 80 with two down reflectors 81 in the central section with two lamps each. Oblique side reflectors 82
10 also have two lamps each.

In the foregoing description, certain terms and visual depictions are used to illustrate the preferred embodiment. However, no unnecessary limitations are to be construed by the terms used or illustrations depicted, beyond what is shown in the
15 prior art, since the terms and illustrations are exemplary only, and are not meant to limit the scope of the present invention.

It is further known that other modifications may be made to the present invention, without departing the scope of the invention, as noted in the appended Claims.